Extended Abstract:

The Trade-Off Between Targeting and Price Pass-Through in the Design of Housing Vouchers: Evidence from Chile*

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Governments worldwide subsidize homeownership; every OECD country has such policies in place, with the majority using vouchers and grants, led by Chile which pioneered vouchers in 1977 and now leads OECD spending on these programs at 0.47% of GDP (OECD, 2023).[1] Yet two concerns challenge their effectiveness for increasing homeownership rates. First, subsidies may capitalize into higher housing prices, particularly in supply-inelastic segments, reducing assistance value for beneficiaries while imposing pecuniary externalities on non-recipients (Hilber and Schöni, 2022). Second, poor targeting may waste resources on inframarginal households who would become homeowners regardless (Glaeser and Shapiro, 2003). The extensive literature studying targeting and impacts of homeownership subsidies rarely treats these concerns jointly.

The price pass-through of homeownership subsidies is an equilibrium outcome determined by who gets assistance and housing market fundamentals. Beneficiaries' preferences mediate the distribution of the subsidy shock across housing segments, with price adjustments driven by the

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[1] Of 38 OECD countries reviewed in OECD (2023), 23 subsidize via vouchers or grants, 33 through subsidized mortgages, and 31 via tax benefits. Rationales for subsidizing homeownership include positive externalities, imperfect mortgage markets, and wealth redistribution. See Sodini et al. (2023) and references therein for a literature review and causal effects of homeownership.

most exposed segments' supply elasticities. Following Akerlof (1978) *tagging* intuition, policymakers must weigh benefits from targeting certain groups against the price inflation they induce (Allcott et al., 2015). Targeting homeownership assistance is challenging: programs are often rationed due to high costs, and *need* is hard to measure, prompting policymakers to employ multiple screening tools including means-testing, waitlists, and choice restrictions (Nichols and Zeckhauser, 1982). Designing effective homeownership assistance requires jointly setting program features, targeting decisions, and screening mechanisms. This paper asks: What are the equilibrium and distributional effects of large-scale homeownership vouchers? How quantitatively relevant is the trade-off between targeting and price pass-through in policy design?

To answer these questions, I build and estimate a competitive equilibrium model of a city's homeownership market with targeted and rationed vouchers The model endogenizes the key dimensions for evaluating alternative voucher designs: voucher take-up, distortion of beneficiaries' and non-beneficiaries' choices, and supply responses through both transactions and development. I estimate the model using administrative data on DS1 voucher applications and use, the universe of real estate transactions, and new development surveys in Santiago from 2012 to 2018. The DS1 program offers a menu of downpayment vouchers varying in generosity and choice restrictions, with price caps limiting eligible housing units. Means-tested eligible households decide whether and which voucher to apply for; available vouchers are rationed through priority scores. The policy operates at substantial scale, subsidizing 14% of all and 35% of eligible transactions. The program underwent regular updates during the study period, introducing new voucher types and modifying existing ones, with both the quantity and composition of awarded vouchers varying over time.

[Main Results summary]

I begin by documenting three facts about the DS1 program and the housing market in Santiago. First, beneficiaries' purchases are concentrated in the product and geographic space, relative to eligible units. The concentration across space is primarily driven by beneficiaries' purchasing units in their origin neighborhoods, around half of beneficiaries purchase units in their county of origin. They also concentrate in small resale houses, which is driven by large families with children, which have priority for vouchers. Second, I exploit variation in the voucher menu design to document that beneficiaries' housing choices, applicants' decisions, and the composition of beneficiaries react to changes in voucher design. When a beneficiary's voucher gets updated, they buy larger houses in neighborhoods with more college-educated people. However, changes in

voucher design also affect who applies and gets vouchers. Finally, exploiting variation in housing units' exposure to the policy across space (i.e., beneficiaries' locations) and time (i.e., number of vouchers awarded), I document that voucher exposure correlates with higher housing prices and increases new development.

Motivated by these facts, I build a model of housing supply and demand with homeownership subsidies. The housing market is competitive and segmented; each period, discrete housing types are traded at equilibrium prices and quantities, with types defined by units' location and physical characteristics (size, apartment/house, new/resale). Housing demand is static, determined by subsidized and unsubsidized households deciding whether and which type to purchase. Household preferences vary by demographics (income, age, family size, location) and unobserved price sensitivity and homeownership value. Eligible households first decide whether and which voucher to apply for based on their housing preferences, weighing purchase delays and choice restrictions against price discounts. Vouchers are allocated through equilibrium cutoff scores determined by the rationing mechanism and application distribution. The set of subsidized households emerges from the interaction between preference distribution and equilibrium prices and cutoffs. Vouchers distort beneficiaries' choices both by price discounts and choice restrictions, while pecuniary externalities distort non-beneficiaries' choices.

The supply of each housing type is determined by atomistic unit owners deciding whether to sell each period. I differentiate between housing flow and stock by distinguishing the behavior of new and resale unit owners. New-type units are owned by single-product, forward-looking firms that decide when to sell by comparing current prices and expected future returns against holding costs. The stock is determined by small developers' construction decisions each period plus remaining inventory. The resale stock of each type is an exogenous share of existing units considering selling each period; owners sell when market prices exceed opportunity costs. Both owners and developers respond to equilibrium prices, with vouchers affecting both supplied quantities (flow) and new development (stock).

I estimate demand parameters via maximum likelihood, extending the MDLE estimator of Grieco et al. (2025) to account for selection into vouchers based on preferences. The main challenge for demand estimation is the endogeneity concern due to correlation between prices and unobserved preferences. If vouchers were randomly assigned or allocated based solely on observables, household-level variation in prices and choice sets would identify demand parameters

(McFadden, 1972) and the MDLE estimator could be directly applied. However, households select into vouchers based on the same preference parameters being estimated. Moreover, microdata on housing choices is only available for voucher recipients, precluding standard selection correction methods like control functions that would exploit quasi-random variation from rationing rules. I overcome this by exploiting the microfounded voucher application model to jointly estimate housing and voucher demand. This approach controls for selection into vouchers, allowing me to exploit the aforementioned variation as if vouchers were randomly assigned.

[results demand summary]

Supply is estimated through IV regressions. For new types, I obtain a linear estimating equation for maintenance costs via Hotz-Miller inversion (Hotz and Miller, 1993; Arcidiacono and Miller, 2011; Scott, 2014), then estimate development cost parameters using developers' first-order conditions and simulated unit values. For resale types, the logit structure of owners' problems permits direct IV logit estimation. All specifications face endogeneity from correlation between unobserved costs and equilibrium prices. The DS1 program generates quasi-experimental variation in housing type exposure: voucher quantities vary over time, while beneficiary locations and price caps concentrate demand in specific neighborhoods. However, approaches exploiting this variation through treatment categories, such as shift-share instruments, are invalid due to within-city demand substitution violating SUTVA (Alves et al., 2023). I construct instruments using the estimated demand model to capture policy-induced demand changes for each housing type while incorporating substitution effects.

[results supply summary]

I use the estimated model to evaluate alternative voucher designs' effects on housing prices, new development, as well as their distributional consequences across households. In the first set of counterfactuals, I evaluate the equilibrium effects of the DS1 program by comparing to a baseline without the program. Overall, the policy increases homeownership rates by 16.3%, and increases prices and new development by 3.6% and 1.3%, respectively. However, there is great heterogeneity behind the aggregates. First, the policy's effects vary sharply by assistance status: beneficiaries' homeownership increases by 21.4%, eligible non-beneficiaries' decreases by 11.2%, while non-eligible households see virtually no change (-0.4%). Second, price pass-through varies dramatically by segment: resale housing eligible for vouchers sees prices increase by 12.2%, while eligible new

housing prices rise by only 1.% as new development in these segments increases by 5.3%. The interaction between the voucher policy and the new development response also drives the winners and losers of the policy. The most negatively affected non-beneficiaries are poorer, older, and large households, who have preferences for houses whose prices are the most inflated by the policy. On the other hand, there is virtually a zero negative impact of the policy on younger and smaller households, since they have preferences for small new apartments whose prices are almost unaffected by the policy.

In the second set of counterfactuals, I evaluate alternative budget-balanced policy designs. First, I simulate an All-High and All-Low policy where the entire DS1 budget is allocated to the most generous and most restrictive voucher, or to the least generous, least restrictive, and least targeted voucher. Allocating everything to the High voucher mechanically improves targeting due to the means-testing, but concentrates the demand into housing segments below the price cap and that are preferred by the poorest households. The opposite is true for the All-Low policy, where targeting is worse but the policy is less concentrated, both by the higher price cap and by being attractive to a broader range of households. I find that these policies are dominated by the DS1 policy, highlighting the gains from offering a menu of alternatives to screen households. While the most targeted, the All-High policy has lower impacts on homeownership rates, due to its high price pass-through so both beneficiaries and non-beneficiaries are less likely to become homeowners relative to the DS1 policy. The All-Low policy has a lower price pass-through than the DS1 policy, but lower overall impacts on homeownership rates as it ends up targeting inframarginal households. Notably, low-income households reduce their application rates relative to the DS1 policy, since the benefit is insufficient, so richer households end up getting vouchers.

Finally, motivated by the findings on new housing types being more elastic due to the response of developers, I evaluate a policy that replicates the DS1 voucher menu but only allows new housing units to be purchased. I find that this policy has lower price pass-through, higher impacts on new development, and almost negligible effects on the homeownership rates of non-beneficiaries. However, this comes at the cost of dramatically changing the composition of beneficiaries, with younger, smaller, and slightly richer households receiving assistance. Interestingly, the losers of the policy are the poorer, older, and larger households who lost their vouchers relative to the DS1 policy. However, the non-beneficiaries under the DS1 policy benefit from this policy change.

Contribution to the literature. This paper's main contribution is to the literature studying

the design and equilibrium effects of housing assistance programs; including how program rules affect targeting and beneficiary outcomes (Van Dijk, 2019; Waldinger, 2021; Cook et al., 2023; Lee et al., 2023), as well as its impact on the housing market and welfare (Hanson, 2012; Hilber and Turner, 2014; Sommer and Sullivan, 2018; Diamond et al., 2019; Diamond and McQuade, 2019; Gruber et al., 2021; Bishop et al., 2023). I focus on the design of large-scale homeownership vouchers, where both voucher take-up and supply-side responses are endogenous. Most studies on the impact of voucher design changes treat either recipient composition or supply as fixed (Galiani et al., 2015; Chetty et al., 2016; Collinson and Ganong, 2018; Bergman et al., 2024), limiting their ability to evaluate the consequences of scaling or redesigning programs (Kline and Walters, 2016; Walters, 2018). Meanwhile, studies on the equilibrium impacts of assistance on housing markets typically treat both program features and targeting as exogenous (Susin, 2002; Eriksen and Ross, 2015; Davis et al., 2021; Soltas, 2023). I bridge these literatures by endogenizing both voucher take-up and supply-side responses, and quantitatively showing the relevance of both for the design of large-scale homeownership vouchers.

More broadly, this paper contributes to the literature on the equilibrium effects and design of voucher policies in high-stakes settings such as education (Neilson, 2013; Armona and Cao, 2023; Sanchez, 2023; Bodéré, 2023) and health (Einav et al., 2019; Finkelstein et al., 2019; Decarolis et al., 2020; Tebaldi, 2025). In particular, to the strand of the literature quantitatively measuring the relevance of *tagging* for the effectiveness of such programs (Dobbin et al., 2021; Polyakova and Ryan, 2023), which has focused in the costs and benefits of assigning subsidies to certain demographic groups when firms' strategic responses are considered. I study tagging effects in a new setting, where the composition of beneficiaries is endogenous and the cost of targeting certain groups comes from how they concentrate the subsidy shock across market segments. I show that *tagging* effects are quantitatively relevant even with a competitive supply.

Second, this paper contributes to the literature on the determinants of housing supply in segmented housing markets (Saiz, 2010; Piazzesi and Schneider, 2016; Calder-Wang, 2021; Abramson, 2021; Baum-Snow and Han, 2024; Almagro and Domínguez-Iino, 2024; Mabille et al., 2024). The main contribution is to provide a unified analysis of both housing flows (transactions) and stock (new construction), as the literature typically focuses on one or the other. My empirical results highlight the relevance of both unit characteristics and location when defining housing segments; I find that the former are more important than the latter for the heterogeneity in supply

elasticities within a city. More broadly, my results highlight the relevance of understanding supply determinants and heterogeneity when evaluating demand-side housing policies.

Third, I build on the literature estimating housing demand using discrete choice models (Bayer et al., 2007; Calder-Wang, 2021; Almagro and Domínguez-Iino, 2024), and more broadly, on studies using microdata and exploiting individual-level variation in prices or choice sets to identify demand parameters (Berry and Pakes, 2007; Bundorf et al., 2012; Neilson, 2013; Bodéré, 2023; Berry and Haile, 2024; Tebaldi, 2025). I provide a simple model-based approach to exploit the identifying variation induced by subsidies by jointly estimating selection and demand models in a challenging setting. First, individuals select into subsidies based on preferences, making the variation unexploitable with standard methods (Nevo, 2001; Petrin, 2002; Berry et al., 2004; Conlon and Gortmaker, 2025; Grieco et al., 2025). Second, microdata is only available for subsidized households, precluding non-parametric selection correction methods (Heckman and Robb, 1985; Imbens and Newey, 2009; Agarwal, 2015). As governments are making data on assistance programs increasingly available, and data on non-treated households is often limited, this approach may be useful for applied work.

Finally, my results provide empirical support for the relevance of the trade-offs studied in the theoretical literature on the design of assistance programs under imperfect information (Nichols and Zeckhauser, 1982; Akerlof, 1978; Dworczak et al., 2021; Yang et al., 2023; Akbarpour et al., 2024; Banerjee et al., 2024). While motivated by this literature, I do not aim to characterize the optimal voucher design and instead evaluate simple, policy-relevant reforms. One of the main reasons for this choice is the lack of tractable theoretical results for the design of assistance. In particular, direct revelation mechanisms are not feasible to allocating housing vouchers due to the high dimensionality of housing preferences, which highlights the need for theoretical results on the implementation of the optimal mechanisms.